

What is claimed is:

1 A system for inserting an electronic watermark data comprising:

DCT converter for extracting a block of $k \times k$ pixels from an original image, subjecting said block to DCT (discrete cosine transform), and then outputting data after the DCT conversion;

quantizer for quantizing DCT coefficients output from said DCT converter;

10 movement decision means for deciding the magnitude of a movement based on a generation amount from said DCT converter;

picture-type decision means for deciding a picture type;

15 an electronic watermark data table for storing first to j -th electronic watermark data and electronic watermark data of $(j \times 2)$ types having said movement, for each picture type;

electronic watermark data selector for selecting said electronic watermark data of one type according to said picture type and said movement; and

20 electronic watermark data inserter means for inserting said selected electronic watermark data into data after said DCT conversion;

25 whereby the magnitude of a movement is decided by

obtaining a difference between a DCT coefficient of a front frame and a DCT coefficient of a rear frame and electronic watermark data with a suitable strength is inserted according to the magnitude of said movement.

- 5 2 A system for inserting an electronic watermark data comprising:

DCT converter for extracting a block of $k \times k$ pixels from an original image, subjecting said block to DCT (discrete cosine transform), and then outputting data after the DCT conversion;

10 quantizer means for quantizing DCT coefficients output from said DCT converter means;

movement decision means for deciding the magnitude of a movement based on a generation amount from said DCT converter means;

15 picture-type decision means for deciding a picture type;

original electronic watermark data memory for storing original electronic watermark data;

20 j first multipliers each for subjecting said original electronic watermark to multiplication data according to said picture type;

an electronic watermark data table for storing electronic watermark data of j types ranging from the first electronic watermark data to j-th electronic

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watermark data being outputs from said j multipliers;
electronic watermark data selector for selecting
electronic watermark data of one type among said
electronic watermark data of j types;

5 a second multiplier for subjecting said selected
electronic watermark data to multiplication according
to the magnitude of a movement obtained based on a
difference between said DCT coefficients; and
electronic watermark data insertion means for inserting
10 electronic watermark data obtained through
multiplication by said second multiplier into data
after said DCT conversion;
whereby the magnitude of a movement is decided by
obtaining a difference between a DCT coefficient of a
15 front frame and a DCT coefficient of a rear frame and
electronic watermark data with a suitable strength is
inserted according to the magnitude of said movement.

3 A Apparatus for inserting an electronic watermark data comprising:

20 a DCT converter for extracting a block of $k \times k$ pixels
from an original image, subjecting said block to DCT
(discrete cosine transform), and then outputting data
after the DCT conversion;

a quantizer for quantizing DCT coefficients output from
25 said DCT converter;

- a movement decision unit for deciding the magnitude of
a movement based on a generation amount from said DCT
converter;
- 5 a picture-type decision unit for deciding a picture
type;
- an electronic watermark data table for storing first to
j-th electronic watermark data and electronic
watermark data of $(j \times 2)$ types having said movement,
for each picture type;
- 10 an electronic watermark data selector for selecting
said electronic watermark data of one type according
to said picture type and said movement; and
- an electronic watermark data inserter for inserting
said selected electronic watermark data into data
after said DCT conversion;
- 15 an inverse quantizer for inverse-quantizing a block of
 $k \times k$ pixels in which said electronic watermark data
is inserted; and
- an IDCT converter for performing an IDCT (discrete
cosine transform) of a block of $k \times k$ pixels in
which said electronic watermark data inverse-
quantized is inserted.
- 20 4 An apparatus for inserting an electronic watermark data
comprising:
- 25 a DCT converter for extracting a block of $k \times k$ pixels

from an original image, subjecting said block to DCT (discrete cosine transform), and then outputting data after the DCT conversion;

5 a quantizer for quantizing DCT coefficients output from said DCT converter;

a movement decision unit for deciding the magnitude of a movement based on a generation amount from said DCT converter;

10 a picture-type decision unit for deciding a picture type;

an electronic watermark data table for storing first to j-th electronic watermark data and electronic watermark data of $(j \times 2)$ types having said movement, for each picture type;

15 an electronic watermark data selector for selecting said electronic watermark data of one type according to said picture type and said movement; and

an electronic watermark data inserter for inserting said selected electronic watermark data into data after said DCT conversion; and

20 a Huffman encoder for encoding data after insertion of said electronic watermark data.

5 An apparatus for inserting an electronic watermark data comprising:

25 a DCT converter for extracting a block of $k \times k$ pixels

from an original image, subjecting said block to DCT
(discrete cosine transform), and then outputting data
after the DCT conversion;

5 a quantizer for quantizing DCT coefficients output from
said DCT converter;

a movement decision unit for deciding the magnitude of
a movement based on a generation amount from said DCT
converter;

10 a picture-type decision unit for deciding a picture
type;

original electronic watermark data storage means for
storing original electronic watermark data;

j first multipliers each for subjecting said original
electronic watermark to multiplication data according
15 to said picture type;

an electronic watermark data table for storing
electronic watermark data of j types ranging from the
first electronic watermark data to j-th electronic
watermark data being outputs from said j multipliers;

20 an electronic watermark data selector for selecting
electronic watermark data of one type among said
electronic watermark data of j types;

a second multiplier for subjecting said selected
electronic watermark data to multiplication according
25 to the magnitude of a movement obtained based on a

difference between said DCT coefficients; and
an electronic watermark data inserter for inserting
electronic watermark data obtained through
multiplication by said second multiplier into data
after said DCT conversion;
an inverse quantizer for inverse-quantizing a block of
 $k \times k$ pixels in which said electronic watermark data
is inserted; and
an IDCT converter for performing an IDCT (discrete
cosine transform).

10 6 The apparatus for inserting an electronic watermark
data defined in Claim 5, wherein said first multiplier and
said second multiplier are omitted when said
multiplication coefficient is 1.

15 7 An apparatus for decoding an electronic watermark data
comprising:

a decoder for extracting and decoding block data of a
size of $k \times k$ pixels decoded by the electronic
watermark data inserter;

20 an IDCT converter for IDCT converting said block data
decoded;

an electronic watermark data extractor for obtaining
the number of electronic watermark data to be
extracted based on information on the location where
said block data of a $k \times k$ pixel size is extracted

and then extracting electronic watermark data from data after IDCT conversion output from said IDCT converter;

extracted data storage means for storing data extracted by said electronic watermark data extractor; and an electronic watermark data detector for extracting electronic watermark data at a corresponding location by means of said extracted data storage means and said electronic watermark table after said extracted data storage means has stored extracted data for one screen and then calculating a statistical similarity, thus outputting a calculation result.